REMARKS

In the Office Action dated December 12, 2007, claims 2, 9 and 12 were rejected under 35 U.S.C. §112, second paragraph as being indefinite because of the use of the term "DICOM" in those claims. The Examiner stated that the term "DICOM" is not defined in the claim, and the Examiner stated the specification does not provide a standard for ascertaining the definition, and the Examiner further stated that one of ordinary skill in the art would not be reasonably apprised of the scope of the invention.

At least as to the last statement, Applicant submits the Examiner is incorrect, and most likely this is due to unfamiliarity on the part of the Examiner with the pervasive, everyday use of the DICOM standard for transferring medical information, in particular for transferring radiological images. The DICOM (Digital Imaging and Communications in Medicine) standard is the industry standard for that purpose, and is used by virtually every hospital and clinic in the world on a daily basis. Evidence of this meaning of the term "DICOM" is presented in Exhibit "A" attached hereto, which is a printout from the database entitled Magnetic Resonance - Technology Information Portal. The present specification at page 1 has been editorially amended consistent with the definition provided in Exhibit "A".

The fact that details of the DICOM standard are readily ascertainable by those of ordinary skill is indicated by Exhibit "B", which shows the introductory pages from the DICOM Standard website.

A patent applicant is entitled to write his or her patent application based on the assumption of a level of knowledge possessed by those of ordinary skill in the technology to which the invention is related. Those of ordinary skill in the field of

medical communications unquestionably not only know what the DICOM standard is, but also are familiar with every detail, of the DICOM standard, and therefore Applicant is entitled to assume that no more explicit definition, other than the acronym, is necessary in the present specification or claims. Nevertheless, as noted above, the specification has been amended editorially to include such information.

Withdrawal of the rejection of claims 2, 9 and 12 under §112, second paragraph is therefore respectfully requested.

Claims 1-12 were rejected under 35 U.S.C. §102(b) as being anticipated by United States Patent No. 5,513,101 (Pinsky et al., misspelled as Pinksy et al. throughout the Office Action). This rejection is respectfully traversed for the following reasons.

In substantiating the anticipation rejection based on Pinsky et al., the Examiner stated the Pinsky et al. reference discloses proxy server in communication with the data transfer device for converting messages between at least one client and at least one server according to predetermined transformation rules, as set forth in the last element of claim 1 of the present application. The Examiner cited column 1, lines 44-67 of the Pinsky et al. reference as, according to the Examiner, providing such a teaching.

Applicant is unable to find any specific description in this passage in the Pinsky et al. reference cited by the Examiner, or elsewhere in the Pinsky et al. reference, that provides any specific teaching of the use of a proxy server for converting messages between at least one client and at least one server according to predetermined transformation rules. The passage in Pinsky et al. cited by the Examiner is extremely general and provides only background information which is

applicable to almost any medical communications system or network. More importantly, in the Pinsky et al. reference there is not even a need discussed anywhere therein for undertaking a conversion according to predetermined transformation rules, and therefore it is not surprising that there is no specific location or device disclosed in the Pinsky et al. reference at which such a conversion according to predetermined transformation rules is made.

At a minimum, in order to substantiate anticipation of claim 1 by Pinsky et al., Applicant submits the Examiner would have to identify a specific location in the Pinsky et al. reference wherein a need for conversion according to predetermined transformation rules is identified, and then the Examiner would also have to identify a teaching in the Pinsky et al. reference to undertake such a conversion according to predetermined transformation rules in a proxy server that participates in data transfer between at least one client and at least one server. The passage in Pinsky et al. cited by the Examiner does not provide any of those teachings or disclosures, and therefore the Pinsky et al. reference does not anticipate claim 1, nor any of claims 2-6 depending therefrom.

Independent method claim 7 has been amended to now encompass method steps that are comparable in scope to the apparatus features of independent claim 1, and therefore Applicant submits that the above arguments regarding independent claim 1 are equally applicable to independent claim 7, and claim 7 thus is not anticipated by the Pinsky et al. reference, nor any of claims 9-12 depending therefrom.

Moreover, as separate arguments with regard to the patentability of claims 2, 9 and 12, Applicant submits that there is no mention whatsoever of the DICOM

standard in the Pinsky et al. reference. None of the passages cited by the Examiner from the Pinsky et al. reference makes any explicit mention of the DICOM standard. As noted above, however, this standard is universally employed on a daily basis in almost all medical information communications systems, and therefore Applicant agrees that it is likely that the communications system disclosed in Pinsky et al. makes at least some use of the DICOM standard. Nevertheless, as noted above, the present application is particularly concerned with problems associated with the compatibility of the DICOM standard with other communications protocols, and claims 2, 9 and 12 specifically relate the use of the DICOM standard to the aforementioned predetermined transformation rules in independent claims 1 and 7. Despite the likelihood that the Pinsky et al. reference, without making explicit mention thereof, does make use of the DICOM standard, in order to rely on the Pinsky et al. reference as an anticipating reference for any of claims 2, 9 and 12, it is necessary that the Examiner identify some passage in the Pinsky et al. reference that addresses the problem of DICOM compatibility with other communications protocols, and also to identify statements in the Pinsky et al. reference that place a solution to the problem of DICOM compatibility in the possession of the public. Many decisions of the United States Court of Appeals for the Federal Circuit hold that placing the subject matter of a patent claim in question in the possession of the public is a necessary basis for substantiating anticipation. Since the Pinsky et al. reference does not even mention the problem of DICOM compatibility, it is clear that nothing in the Pinsky et al. reference can place a solution to that problem in the possession of the public.

All claims of the application are therefore submitted to be in condition for allowance, and early reconsideration of the application is respectfully requested.

Applicant herewith requests a three-month extension of time for responding to the December 12, 2007 Office Action, so that the period for response is extended from march 12, 2008 to June 12, 2008. This Amendment is accompanied by electronic payment in the amount of $1,050.00 for the fee required by 37 C.F.R. §1.17(a)(3).

The Commissioner is hereby authorized to charge any additional fees which may be required, or to credit any overpayment to account No. 501519.

Submitted by,

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Attorneys for Applicant

CH1\5820748.1

Info Sheets

- Artifacts
- Coils
- Contrast Agents
- Devices
- Images
- Sliders
- Sequences
- Abbreviations
- Acronyms
- Patient Information

'dicom'

SEARCH FOR go! search it again go!

2 3 5 A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

DICOM ▸ Digital Imaging and COmmunications in Medicine

Searchterm 'dicom' was found in the Abbreviation Register.

Result : Searchterm **'dicom'** found in **0** term [ ] and **4** definitions [ ]
1 - 4 (of 4) Result Pages : [**1**]

▾ bottom

Searchterm 'dicom' was also found in the following services of MR-TIP.com:

▸ **Resources** [ ] ▸ **Forum** [ ]

Digital Imaging and Communications in Medicine

(DICOM) **DICOM** is the industry standard for transferral of radiologic images and other medical information between computers. Patterned after the Open System Interconnection of the International Standards Organization, **DICOM** enables digital communication between diagnostic and therapeutic equipment and systems from various manufacturers.

The **DICOM** 3.0 standard evolved from versions 1.0 (1985) and 2.0 (1988) of a standard developed by the American College of Radiology (ACR) and National Electrical Manufacturers Association (NEMA). To support the implementation and demonstration of **DICOM** 3.0, the RSNA Electronic Communications Committee began to work with the ACR-NEMA MedPacs ad hoc section in 1992.

Also Picture Archiving and Communication Systems (PACS), which are connected with the Radiology Information System (RIS) use commonly the **DICOM** standard for the transfer and storage of medical images.

Further Reading:

Out-side

- Congresses
- Resources

MR-Commu

User
Pass
Register

MRI po
Typical dowr your scan system per w h) :
none
10 min.
30 min.
1 hour
3 hours
more
don't ask
Contri
Resu

Lo
Gree
Syml
Units

Late
MF
Ultras

EXHIBIT A

ALL-STATE LEGAL

See a comprehensive list of contrast agents! From Abdoscan® to Teslascan®.

Basics:

- The DICOM Standard
  by www.psychology.nottingham.ac.uk
- DICOM standard in Medical imaging: What does the radiologist has to know ?
  by eviewbox.sourceforge.net

News & More:

- 3D Cardiac Segmentation Software
  by www.medinews.com
- ImageMagick - Convert, Edit, and Compose Images
- MR-Technology

MRI Resources

Musculoskeletal and Joint MRI - Knee MRI - Directories - Claustrophobia - Brain MRI - Most Wanted

MRI Equipment

The MRI equipment consists of following components:

- The magnet generates the magnetic field.
- Shim coils make the magnetic field homogeneous.
- Radio frequency coils transmit the radio signal into the body part being imaged.
- Receiver coils detect the returning radio signals.
- Gradient coils provide spatial localization of the signals.
- Shielding coils produce a magnetic field that cancels the field from primary coils in regions where it is not desired.
- The computer reconstructs the signals into the image.
- The MRI scanner room is shielded by a faraday shield.
- Different cooling systems cool the magnet, the scanner room and the technique room.

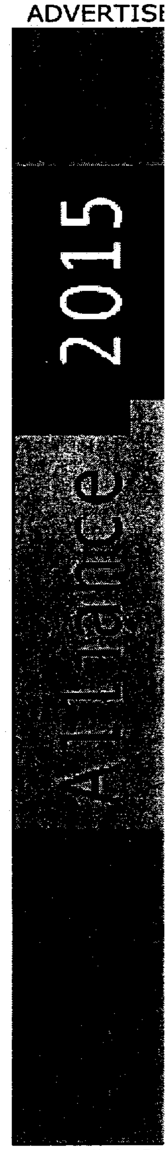
Better MRI equipment and software design along with the latest information technology improves system maintenance and overall communication. Software and digital imaging and communications in medicine (**DICOM**) compatibility allows to network into hospital databases, helps to modify pulse sequences, data post processing, and archiving via picture archiving and communication system (PACS).

See also the related poll result: 'Most outages of your scanning system are caused by failure of'

Further Reading:

Basics:

Give MR Feedb
Make M Your Sta
Bookr MR-
Help
Subm Link/Re (login or firs



- [MRI: Are You Playing Your System Like a Fiddle or a Stradivarius?](#)
  Wednesday, 3 November 2004 by www.transtateonline.com

News & More:

- Magnetic Resonance in Medicine in 2020
  2005 by www.imagingeconomics.com
- Dräger introduces anaesthesia system for MRI environment
  Wednesday, 12 December 2007 by www.mtbeurope.info

•• There are 4 news about 'MRI Equipment'.

Searchterm 'dicom' was also found in the following services of MR-TIP.com:

▸ **Resources [illegible]** ▸ **Forum [2]**

ONI Medical Systems, Inc.

Founded in June 1997, ONI is a privately held company headquartered in Wilmington, Massachusetts. ONI is focused on addressing the new healthcare economics by delivering the next generation of MRI machines: high field, low cost dedicated purpose systems. The company's first offering was the OrthOne™. Further developements lead to the MSK Extreme™, a 1.0 Tesla dedicated purpose MR system with v-SPEC™ Technology and **DICOM** Conformance for extremity applications.

MRI Related Product Line:

MSK Extreme™

Contact Information

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PHONE	+1-978-658-0020
FAX	+1-978-658-0898
E-MAIL	info@onicorp.com
ONLINE	www.onicorp.com

•• There are 4 news about 'ONI Medical Systems, Inc.'.

MRI Resources

MRA - MRI Technician and Technologist Career - Patient Information - Pacemaker - Mass Spectrometry - Cardiovascular Imaging

Picture Archiving and Communication System

(PACS) A system used to communicate and archive medical imaging data, mostly images and associated textural data generated in a radiology department, and disseminated throughout the hospital. A PACS is usually based on the **DICOM** (Digital Imaging and Communications in Medicine) standard.
The main components in the PACS are:

- acquisition devices where the images are acquired,
- short and longer term archives for storage of digital and textural data,
- a database and database management,
- diagnostic and review workstations,
- software to run the system,
- a communication network linking the system components,
- interfaces with other networks (hospital and radiological information systems).

Acquisition devices, which acquire their data in direct digital format, like a MRI system, are most easily integrated into a PACS.
Short term archives need to have rapid access, such as provided by a RAID (redundant array of independent disks), whereas long term archives need not have such rapid access and can be consigned, e.g. to optical disks or a magnetic.
High speed networks are necessary for rapid transmission of imaging data from the short term archive to the diagnostic workstations. Optical fibre, ATM (asynchronous transfer mode), fast or switched Ethernet, are examples of high speed transmission networks, whereas demographic textural data may be transmitted along conventional Ethernet.
Sophisticated software is a major element in any hospital-wide PACS. The software concepts include: preloading or prefetching of historical images pertinent to current examinations, worklists and folders to subdivide the vast mass of data acquired in a PACS in a form, which is easy and practical to access, default display protocols whereby images are automatically displayed on workstation monitors in a prearranged clinically logical order and format, and protocols radiologists can rapidly report worklists of undictated examinations, using a minimum of computer manipulation.

Further Reading:

Basics:

- Healthcare IT Yellow Pages PACS / Image Management Directory
  by www.health-infosys-dir.com

News & More:

- Philips releases low cost PACS system for budget conscious customers
  Wednesday, 19 January 2005 by www.medical.philips.com

•• There is 1 news about 'Picture Archiving and Communication System'.

Searchterm 'dicom' was also found in the following services of MR-

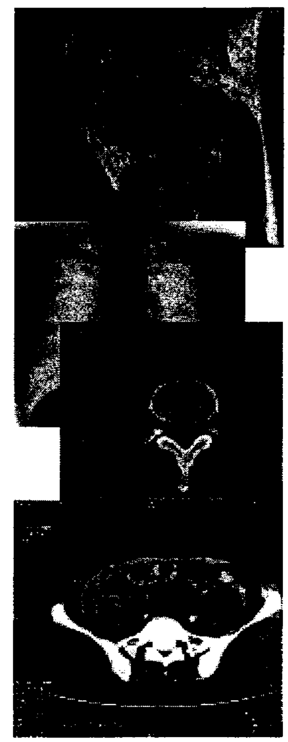
[last update: 2008-06-02

The DICOM Standard

This guide gives is a brief description of the DICOM standard, which is commonly used for the transfer and storage of medical images.

- An introduction to the DICOM single-file format
- The DICOM header
- Window center and window width (aka brightness and contrast)
- Links to free DICOM viewers
- Links to free DICOM servers/clients
- Links to sample DICOM images
- Links to DICOM resources

An introduction to the DICOM single-file format



The Digital Imaging and Communications in Medicine (DICOM) standard was created by the National Electrical Manufacturers Association (NEMA) to aid the distribution and viewing of medical images, such as CT scans, MRIs, and ultrasound. Part 10 of the standard describes a file format for the distribution of images. This format is an extension of the older NEMA standard. Most people refer to image files which are compliant with Part 10 of the DICOM standard as DICOM format files. A complete copy of the standard (in PDF format) is avaiable for download (drafts of the standard are organized by year).

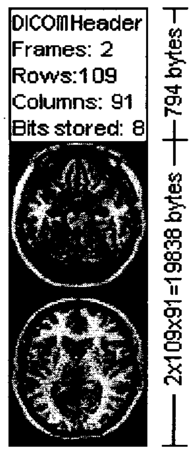
A single DICOM file contains both a header (which stores information about the patient's name, the type of scan, image dimensions, etc), as well as all of the image data (which can contain information in three dimensions). This is different from the popular Analyze format, which stores the image data in one file (*.img) and the header data in another file (*.hdr). Another difference between DICOM and Analyze is that the DICOM image data can be compressed (encapsulated) to reduce the image size. Files can be compressed using lossy or lossless variants of the JPEG format, as well as a lossless Run-Length Encoding format (which is identical to the packed-bits compression found in some TIFF format images).

DICOM is the most common standard for receiving scans from a hospital. Neuroimagers and neuropsychologists who wish to use SPM to normalize scans to stereotaxic space will need to convert these files to Analyze format. My freeware MRIcro software will directly convert most DICOM images to and from Analyze format. Eric Nolf's free Medcon and XMedcon software can also convert between Analyze and DICOM.

The DICOM header

The Image on the left shows a hypothetical DICOM image file. In this example, the first 794 bytes are used for a DICOM format header, which describes the image dimensions and retains other text information about the scan. The size of this header varies depending on how much header information is stored. Here, the

header defines an image which has the dimensions 109x91x2 voxels, with a data resolution of 1 byte per voxel (so the total image size will be 19838). The image data follows the header information (the header and the image data are stored in the same file).



MRI.*

```
irst 128 bytes: unused by DICOM format
ollowed by the characters 'D','I','C','M'
his preamble is followed by extra information e.g.:

002,0000,File Meta Elements Group Len: 132
002,0001,File Meta Info Version: 256
002,0010,Transfer Syntax UID: 1.2.840.10008.1.2.1.
008,0000,Identifying Group Length: 152
008,0060,Modality: MR
008,0070,Manufacturer: MRIcro
018,0000,Acquisition Group Length: 28
018,0050,Slice Thickness: 2.00
018,1020,Software Version: 46\64\37
028,0000,Image Presentation Group Length: 148
028,0002,Samples Per Pixel: 1
028,0004,Photometric Interpretation: MONOCHROME2.
028,0008,Number of Frames: 2
028,0010,Rows: 109
028,0011,Columns: 91
028,0030,Pixel Spacing: 2.00\2.00
028,0100,Bits Allocated: 8
028,0101,Bits Stored: 8
028,0102,High Bit: 7
028,0103,Pixel Representation: 0
028,1052,Rescale Intercept: 0.00
028,1053,Rescale Slope: 0.00392157
FE0,0000,Pixel Data Group Length: 19850
FE0,0010,Pixel Data: 19838
```

'ransfer Syntax UID	Definition
.2.840.10008.1.2	Raw data, Implicit VR, Little Endian
	Raw data, Eplicit VR **x** = 1: Little

Further down, I show a more detailed list of the DICOM header as displayed by my software. Note that DICOM requires a 128-byte preamble (these 128 bytes are usually all set to zero), followed by the letters 'D', 'I', 'C', 'M'. This is followed by the header information, which is organized in 'groups'. For example, the group 0002hex is the file meta information group, and (in the example on the left) contains 3 elements: one defines the group length, one stores the file version and the third stores the transfer syntax.

The DICOM elements required depends on the image type, and are listed in Part 3 of the DICOM standard. For example, this image modality is 'MR' (see group:element 0008:0060), so it should have elements to describe the MRI echo time. The absence of this information in this image is a violation of the DICOM standard. In practice, most DICOM format viewers (including MRIcro and ezDICOM) do not check for the presence of most of these elements, extracting only the header information which describes the image size.

The NEMA standard preceded DICOM, and the structure is very similar, with many of the same elements. The main difference is that the NEMA format does not have the 128-byte data offset buffer or the lead characters 'DICM'. In addition, NEMA did not explicitly define multi-frame(3D) images, so element 0028,0008 was not present.

Of particular importance is group:element 0002:0010. This defines the '**Transfer Syntax Unique Identification**' (see the table on the left). This value reports the structure of the image data, revealing whether the data has been compressed. Note that many DICOM viewers can only handle uncompressed raw data. DICOM images can be compressed both by the common lossy JPEG compression scheme (where some high frequency information is lost) as well as a lossless JPEG scheme that is rarely seen outside of medical imaging (this is the original and rare Huffman lossless JPEG, **not** the more recent and efficient JPEG-LS algorithm). These codes are described in Part 5 of the DICOM standard. A nice introduction to this the transfer syntax is provided at www.barre.nom.fr.

Note that as well as reporting the compression technique (if any), the Transfer Syntax UID also reports the byte order for raw data. Different computers store integer values differently, so called 'big

.2.840.10008.1.2.x	Endian x = 2: Big Endian
.2.840.10008.1.2.4.xx	JPEG compression xx = 50-64: Lossy JPEG xx = 65-70: Lossless JPEG
.2.840.10008.1.2.5	Lossless Run Length Encoding

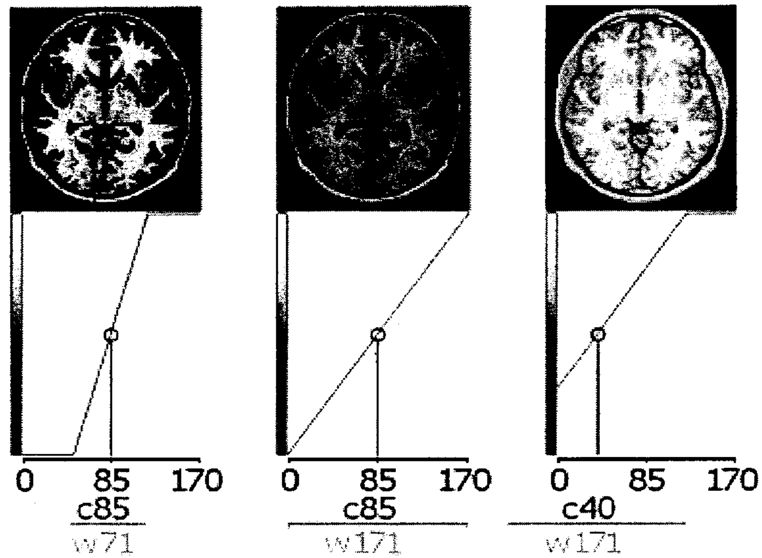
endian' and 'little endian' ordering. Consider a 16-bit integer with the value 257: the most significant byte stores the value 01 (=255), while the least significant byte stores the value 02. Some computers would save this value as 01:02, while others will store it as 02:01. Therefore, for data with more than 8-bits per sample, a DICOM viewer may need to swap the byte-order of the data to match the ordering used by your computer.

In addition to the Transfer Syntax UID, the image is also specified by the Samples Per Pixel (0028:0002), Photometric Interpretation (0028:0004), the Bits Allocated (0028:0100). For most MRI and CT images, the photometric interpretation is a continuous monochrome (e.g. typically depicted with pixels in grayscale). In DICOM, these monochrome images are given a photometric interpretation of 'MONOCHROME1' (low values=bright, high values=dim) or 'MONOCHROME2' (low values=dark, high values=bright). However, many ultrasound images and medical photographs include color, and these are described by different photometric interpretations (e.g. Palette, RGB, CMYK, YBR, etc). Some colour images (e.g. RGB) store 3-samples per pixel (one each for red, green and blue), while monochrome and paletted images typically store only one sample per image. Each images store 8-bits (256 levels) or 16-bits per sample (65,535 levels), though some scanners save data in 12-bit or 32-bit resolution. So a RGB image that stores 3 samples per pixel at 8-bits per can potentially describe 16 million colours (256 cubed).

/indow center and window width (aka rightness and contrast)

:ople familiar with the medical imaging typically lk about the 'window center' and the 'window idth' of an image. This is simply a way of :scribing the 'brightness' and 'contrast' of the image. hese values are particularly important for ray/CT/PET scanners that tend to generate ›nsistently calibrated intensities so you can use a ›ecific C:W pair for every image you see (e.g.)0:2000 might be good for visualising bone, while):350 might be a better choice for soft tissue). Note at contrast in MRI scanners is relative, and so a :W pair that works well for one protocol will 'obably be useless with a different protocol or on a fferent scanner. The figure on the right illustrates e concept of changes to'window center' and /indow width'. Along the top row you can see three ews of the same image with different C:W settings. he bottom row illustrates the colour mapping for ıch image (with the vertical axis of the graph ıowing rendered brightness and the horizontal axis

ıowing the image intensity). Consider this image ith intensities ranging from 0 to 170. A good arting estimate for this image might be a center of 5 (mean intensity) and width of 171 (range of alues), as shown in the middle panel. Reducing the idth to 71 would increase the contrast (left panel). n the other hand, keeping a width of 171 but ducing the center to 40 would make the whole nage appear brighter.



inks to free DICOM viewers

- My free ezDICOM software runs on Windows computers. Availaible as a standalone Windows program or as an ActiveX component (allowing plug-and-play use with Delphi, VisualBasic, C#, VisualC, InternetExplorer and other ActiveX aware programs). It is able to display most types of DICOM image (many other viewers are limited to showing uncompressed grayscale DICOM images) and can automatically detect and open Analyze, DICOM, Genesis, Interfile, Magnetom, Somatom and NEMA images. ezDICOM is part of the Sourceforge community.
- MRIcro is my freeware for Windows and Linux. MRIcro can view Analyze, DICOM, ECAT, Genesis, Interfile, Magnetom, Somatom and NEMA images and convert them to the popular Analyze format. This program uses the same dicom.pas Pascal unit as ezDICOM, but includes a number of additional features. It is more difficult to use than ezDICOM, but also more powerful.
- MRIcron is my open source successor to MRIcro. It runs on Windows, Linux and Macintosh. the included dcm2nii can convert DICOM images to the popular Analyze and NIfTI standards.
- Julius is a free DICOM viewer/browser and volume renderer for Windows and Linux computers. Julius is not only a DICOM viewer but also a software framework for medical applications.
- FP Image is a free DICOM viewer/browser for Windows that can also anonymize images.
- Rubo Medical Imaging has a free demo of their Windows DICOM software, with some functions disabled.
- Inviweb has a free version of their Windows DICOM viewer.
- Able Software has a free version of their "3D-Doctor" Windows software, with some functions disabled.
- Comview's free ViewStarPC allows Windows users to view DICOM CDs.
- MillenTech distributes a fairly capable DICOM viewer for Windows.
- Sridhar Raja distributes a free ActiveX DICOM viewer, and his DICOM4india web site includes a lot of useful information about the DICOM format.
- ImageMagick is a freeware Windows, OS2, Linux and Unix program which supports DICOM as well as a broad range of other 2D image formats. ImageMagick can batch convert DICOM images to popular graphics formats (JPEG, GIF, PNG, etc), as described in my FAQ.
- Irfanview is a popular free image viewer for Windows. A plug-in is available for viewing 8-bit DICOM images. This is a useful tool for batch converting DICOM images to JPEG, GIF, PNG, TIF or other common graphics formats, as described in my FAQ.
- NeuroModeller is PC freeware which can create volume rendering from DICOM files (currently beta

release, appears to be unsupported).
- DICOM Works is a promising free PC DICOM viewer.
- MEDAL is a freeware Windows program which can view DICOM and Analyze files on the PC and generate surface reconstructions.
- UnLimiter distribute a free DICOM viewer for Windows.
- IDICON is a set of DOS and Unix tools for manipulating and converting DICOM and Interfile images.
- CarDiCon is a free cardiac DICOM viewer (STD-XABC-CD format). It reads DICOM CDs only.
- TomoVision is a free Windows viewer which can display DICOM, Papyrus, Siemens, Picker and GE files. They also distribute the readOmatic for extracting data from medical image tapes and sliceOmatic for segmentation and reconstruction.
- Easymage is a free DICOM cardiac viewer for Windows.
- ACTIV 2000 is free software for Windows that can view and render medical images (DICOM, GE, Analyze, etc). In addition, it can analye fMRI data. There is also a set of Diffusion and Perfusion tools.
- maZda is a free tool from the Technical University of Lodz for creating and analysing regions of interest (ROIs). This Windows software can view NEMA, Siemens Vision, Siemens Numaris, Bruker Aspect Picker and GE Advantage images.
- The University of Maryland Hospital distributes ImageNet, DICOM viewing freeware for Windows-based web browsers.
- The freeware Osiris program is available for the Macintosh, PC, and some Unix systems.
- XNView is available for Windows and Linux computers.
- Sébastien Barré's free Dicom2 software (Linux, Sun, Windows) can anonymize and convert DICOM images
- David Clunie's Dicom3Tools C toolkit supports a broad range of image formats.
- Onega Wand's DCMviewer is based on the dicomlib toolkit.
- George J. Grevera's C code for DICOM.
- Eric Nolf's free Medcon and XMedcon image conversion packages (DOS, UNIX, Windows) can convert DICOM to the popular Analyze format.
- AMIDE is a free Linux program that can display, overlay and render DICOM, Analyze or ECAT format images.
- V is general purpose freeware for spectral reconstruction, processing and analysis. It is supported on the Sun and SGI platforms.
- J-Mac systems have a DICOM plugin for netscape (only shows single-slice [single-frame] images).
- Dr Razz is a freeware DICOM viewer for the Macintosh [if the web site is down, you can visit the ftp site: ftp://ftp.u.washington.edu/pub/user-supported/razz/].
- Macintosh users can try Oracion, a freeware DICOM/Papyrus format viewer.
- Madena is an impressive looking free Macintosh DICOM viewer.
- iRad is an Objective C open source DICOM viewer for Macintosh OSX computers.
- MacAngioView is a free XA [lossless JPEG compressed] Dicom viewer for Power Macintosh.
- SimpleDICOM is a freeware Java-based DICOM viewer and receiver.
- The Nagoya Institute of Technology provide a Java DICOM applet that can read DICOM images using a http connection
- DICOMscope is a free Java DICOM viewer.
- The Java-based EViewBox is freeware (also see JDICOMviewer by the same author).
- DICOManonymizer and DICOMdumper are Java programs that can view, save and anonymize the data elements and data set of DICOM images. (also: Italian versions of DICOM Anonymizer and DICOMdumper).
- MIPAV [Medical Image Processing, Analysis and Visualization] from the NIH is a powerful, promising and easy to use viewer. This Java based application can run on many platforms (Windows, Mac, Linux, etc).
- Imread is a freeware Java-based DICOM viewer.
- Jivex is a set of Java tools, with Jivex [dv] being the DICOM viewer. The free version can not save

images.
- ImageJ is a popular freeware Java-based DICOM viewer. Free plugins allow ImageJ to support a broad range of image formats (e.g. Analyze) and image processing functions (including volume rendering).

inks to DICOM servers and clients

- PacsOne is a free Picture Archive and Communication System (PACS) for Windows. It contains a DICOM server, a PACS server (using MySQL) and a web server (Apache).
- K-PACS aims to deliver a DICOM viewer and storage system. Modelled after the previously free E-Film.
- PACSview and ACRNview are free Windows programs. Command line Unix programs are also available.
- The Mallinckrodt Institute of Radiology distributes their Central Test Node (CTN) software. They also include documentation.
- Tiani distributes JDicom: a set of free Java tools that include some useful DICOM file sharing utilities.
- SimpleDICOM is a free DICOM client and viewer.
- The Conquest DICOM server is an open source Windows NT/2000 project based on Mark Orskin's UCDMC code.
- DCMTK is a DICOM toolkit including DICOM SCP (Service Class Provider = server) and SCU (Service Class User = Client) programs. Sebastian Meyer provides documentation for using DCMTK. In addition, ImPact describe how to get the basic DCMTK storeSCP server running.

inks to sample DICOM images

- Sébastien Barré has a great archive of DICOM images.
- The team behind Osiris have a number of sample DICOM images available.
- The team behind OSIRIX shave a number of sample DICOM images available.
- Lead Teachnologies provides a series of DICOM images using different compression techniques.
- RuboMed distributes some complex DICOM images.
- Philips has an ftp site with several sample DICOM images. [alternate connection]
- A number of GE DICOM images are distributed at UC Davis.
- Washington University School of Medicine distributes a large number of sample DICOM images from their ftp site.
- Links to many DICOM image datasets can be found at the Centre of Medical Imaging Research [CoMIR].

nks to DICOM resources

- dcm2nii can convert DICOM images to the popular NIfTI file format (other excellent converters are also listed on the dcm2nii page).

nks to DICOM resources

- NEMA hosts the Official DICOM home page, which includes most of the DICOM specification documents in electronic (pdf) format.
- David Clunie's Medical Image FAQ is a great source for information about both medical imaging formats and software. Part 8 lists medical imaging software and images available on the web.